1-25.   (cancelled)

26.   (currently amended) A <u>computer</u> system for storing life science information <u>in a database</u>, the <u>computer</u> system comprising;

<u>a processor;</u>

an electronic database storage module for storing <u>in the database</u> a library of ~~cases~~ ~~frames~~ <u>machine-readable symbolic representations into which life science knowledge is</u> <u>adapted to be encoded according to a life sciences ontology</u>, each ~~case frame~~ <u>machine-</u> <u>readable symbolic representation</u> comprising:

at least two unspecified object identifiers;

a relationship connector, wherein the relationship connector relates two of the at least two object identifiers to each other based on a casual relationship between the object identifiers ~~and is based on a life sciences ontology~~; and

<u>constraint information that defines which connections among the object</u> <u>identifiers are permitted so that life sciences knowledge encoded into the machine-</u> <u>readable symbolic representation is semantically rigorous and based on the life</u> <u>sciences ontology; and</u>

~~an inference engine module~~ <u>a graphical user interface for managing addition of new</u> <u>life sciences data to a database, the graphical user interface comprising</u>:

~~managing the addition of new data to a database of life science data by~~ ~~translating the new data into a form compatible with the database;~~

<u>a display screen that receives an input</u> selecting one of the ~~case frames~~ <u>machine-readable symbolic representations</u> as a template to represent the new data based at least in part on the life science ontology;

<u>the graphical user interface restricting input of any data element that does</u> <u>not conform to the constraint information associated with the selected machine-</u> <u>readable symbolic representation such that the semantically rigorous relationships</u> <u>for the life sciences ontology are maintained;</u>

and assigning elements of the new data to the object identifiers and the relationship connectors, thus assuring newly created life science assertions conform to the life science ontology the graphical user interface receiving input of at least one data element that conforms to the constraint information to instantiate the machine-readable symbolic representation.

27.   (currently amended) The data processing system of claim 26 112, wherein a set of said case frames machine-readable symbolic representations define one of: a biological function, and a chemical reaction.

28.   (cancelled)

29   (currently amended) The data processing system of claim 27, wherein the biological function comprises one of: transport, and digestion of a biomolecule.

30.   (cancelled)

31.   (currently amended) The data processing system of claim 26 112, wherein at least one of the at least two object identifiers identifies one of: a biomolecule, and a biological function.

32.   (cancelled)

33.   (currently amended) The data processing system of claim 26 112, wherein at least one of the at least two object identifiers identifies a relationship connector.

34.   (currently amended) The data processing system of claim 26 112, wherein at least one of the at least two object identifiers identifies an identity relationship.

35.   (currently amended) The data processing system of claim ~~26~~ 112, wherein the relationship connector represents one of: a product relationship, a substrate relationship, and an enzymatic relationship.

36.   (cancelled)

37.   (cancelled)

38.   (currently amended) The computer system of claim 26 ~~further comprising a~~ wherein the graphical user interface ~~configured to permit~~ permits a user to query the database based on the relationship connector.

39.   (cancelled)

40.   (currently amended) The computer system of claim 26 further comprising an access manager configured to restrict access to one or more portions of the electronic database.

41-91. (cancelled)

92.   (currently amended) The computer system of claim 26 further comprising ~~wherein the~~ an inference engine ~~further modifies the selected case frames such that the selected case frames more accurately represent the new data~~ executed by the processor.

93.   (currently amended) The computer system of claim 92 wherein the inference engine provides modifications to at least one machine-readable symbolic representation, wherein the modifications comprise one or more of the addition of new fields, the addition of new relationships, and the addition of metadata.

94.   (currently amended) The ~~computer~~ system of claim 92 wherein the metadata comprises one or more ~~of the source~~ sources of the new data, ~~the~~ a date the new data was received, ~~the~~ a time the new data was received, and ~~the~~ one or more experimental conditions under which the new data was created.

95.   (currently amended) The ~~computer~~ system of claim 26 further comprising a harmonization and transfer module ~~for interfacing~~ executed by the processor to interface with multiple disparate sources of life science data ~~and receiving the new data~~.

96.   (cancelled)

97.   (currently amended) The ~~computer~~ system of claim 95 wherein the harmonization and transfer module further translates ~~the received~~ given data into a data format compatible with ~~the case frames~~ at least one machine-readable symbolic representation.

98.   (currently amended) The ~~computer~~ system of claim 26 ~~further comprising a discovery environment for displaying~~ wherein the graphical user interface displays pathways among the plurality of ~~case frames~~ machine-readable symbolic representations, the pathways representing causal relationships among the ~~case frames~~ machine-readable symbolic representations.

99.   (currently amended) The ~~computer~~ system of claim 26 further comprising a managed account interface ~~for attributing~~ executed by the processor to attribute access restrictions to one or more ~~case frames~~ machine-readable symbolic representations in the database, the access restrictions comprising one of: public access rights, subscription-based access rights, and proprietary access rights.

100.   (cancelled)

101.   (currently amended) ~~A~~ The data processing system ~~for storing life science~~ ~~data, the system comprising:~~

~~an electronic database storage device for storing a plurality of case frames, each~~ ~~case frame comprising:~~

~~at least two object identifiers;~~

~~a relationship connector, wherein the relationship connector relates two of~~ ~~the at least two object identifiers to each other and is based on a life science~~ ~~ontology; and~~

as described in claim 112 wherein the ~~database~~ knowledge base comprises ~~case~~ ~~frames~~ machine-readable symbolic representations representing at least enzyme reactions, binding interactions, modifications of polymers, protein phosphorylation reactions, gene expressions, acetylation, peptide-bond cleavage, glycosylayion, lipidation, fatty-acylation, methylation, metallation, cross-linking, hydroxylation, sulfation, ADP-ribosylation, translocation and transcriptional activations.

102.   (currently amended) The data processing system of claim 101 wherein ~~the~~ ~~case frame representing~~ at least one machine-readable symbolic representation represents a protein phosphorylation ~~reactions comprises~~ reaction comprising a reactant, a product, and a catalyst.

103.   (currently amended) The data processing system of claim 101 wherein ~~the~~ ~~case frame representing~~ at least one machine-readable symbolic representation represents a gene ~~expressions comprises~~ expression comprising a gene and a gene product.

104.   (currently amended) The data processing system of claim 101 wherein ~~the~~ ~~case frame representing~~ at least one machine-readable symbolic representation represents a transcriptional activation ~~comprises~~ comprising a gene expression, an activation, and a transcriptional activator.

105.   (cancelled)

106.   (cancelled)

107.   (new) The data processing system as described in claim 112 wherein the machine-readable symbolic representation is XML or pseudocode.

108.   (new) The computer system as described in claim 26 wherein at least first and second machine-readable symbolic representations in the database comprise a knowledge base of semantically-rigorous life sciences representations against which one or more reasoning algorithms are applied.

109.   (new) The computer system as described in claim 108 wherein applying a reasoning algorithm generates one or more pathways associated with a query to the knowledge base.

110.   (new) The computer system as described in claim 109 wherein the one or more pathways are displayed in the graphical user interface.

111.   (new) The computer system as described in claim 26 wherein the graphical user interface receives attribution information identifying a source of the new life sciences data.

112.   (new) A data processing system, comprising:

a processor;

computer memory that stores a knowledge base comprising a set of biological assertions, wherein a biological assertion is formalized in a machine-readable symbolic representation that comprises at least two object identifiers, a relationship connector that relates at least two the object identifiers to each other based on a casual relationship, and constraint information that defines which of a set of connections among the object identifiers are permitted; and

an inference engine that is executed by the processor against the knowledge base stored in the computer memory (i) to infer a new casual relationship permitted by the constraint information and (ii) to automatically instantiate the new casual relationship into a machine-readable symbolic representation as a new biological assertion that is then added to the knowledge base.

113.   (new)   The data processing system as described in claim 112 further including a graphical user interface that receives a query to the knowledge base and in response thereto generates and displays a graphical representation.

114.   (new)   The data processing system as described in claim 113 wherein the graphical representation is a set of one or more pathways.

115.   (new)   The data processing system as described in claim 113 wherein the query is applied to the knowledge base by a reasoning algorithm.

116.   (new)   The data processing system as described in claim 113 wherein the graphical user interface is used to create a new machine-readable symbolic representation.